Bone Mineral Density Testing Services in Saskatchewan

Summary Report
April 2003

HEALTH QUALITY COUNCIL

The Health Quality Council is releasing this report to inform discussion on appropriate use of bone mineral density testing. Although the research was done by the Health Services Utilization and Research Commission (HSURC), the Health Quality Council took over responsibility for outstanding HSURC research projects on January 1, 2003. The Health Quality Council recognizes that decisions about whether to invest more resources in bone density testing must weigh the potential benefits of this technology against the potential benefits of other health care treatments, a comparison that was beyond the scope of this study.

This is the first study examining the use of bone mineral density (BMD) testing services in Saskatchewan. The goal of our study is to promote the efficient use of BMD testing for primary and secondary prevention of osteoporosis. Comparatively little is known about current referral patterns for BMD testing in the province and how this compares with best evidence-based practice. We wanted to know who in Saskatchewan is being tested and who is not being referred when testing might be indicated.

Introduction

BMD testing measures the average density of bone mineral within the body region scanned and is currently the best available measure of bone strength. This technology is used for the diagnosis and management of osteoporosis. The United States National Institutes of Health consensus conference defined osteoporosis as a skeletal disorder characterized by compromised bone strength predisposing a person to increased risk of fractures (especially at the hip, spine, and wrist). Hip fractures are associated with an increased mortality rate (20% within one year) and are a leading cause of admission to long-term care. In 1998, about 1000 Saskatchewan residents 50 and older experienced a hip fracture. Fractures of the vertebrae may cause severe pain and restrict activity. It is estimated that one half of all postmenopausal women will experience an osteoporosis-related fracture, 15% will suffer a hip fracture. The lifetime risk of men over 50 experiencing a fragility fracture is about 13%.

Osteoporosis is considered preventable and treatable by specialists in the field. Adequate physical exercise and proper nutrition during the years of bone development are important for establishing maximum peak bone mass before natural bone loss begins. In older adults, adequate physical exercise, along with adequate calcium and vitamin D intake, continues to prevent further bone loss. In 1995 bisphosphonate drugs, which inhibit bone loss, were introduced and have subsequently been shown to reduce fracture risk. Hormone replacement therapy in postmenopausal women is effective in preventing bone loss and increasing BMD, but the risks associated with its use must be carefully considered.

Recent Canadian research indicates that 16% of women and 7% of men 50 and over have osteoporosis. American research suggests a higher prevalence rate of 25% in women and 13% in men over 50. Using the more conservative Canadian estimate, this suggests that in Saskatchewan about 25,500 women and 10,000 men aged 50 and over have osteoporosis (based on 2002 Saskatchewan population figures).

During the past several years, there has been considerable controversy around the use of BMD testing for screening perimenopausal and postmenopausal women. The British Columbia Office of Health Technology Assessment (1997) reported that there was insufficient evidence to warrant screening of well women at or near the time of menopause. The Alberta Heritage Foundation for Medical Research (1996) reported that available evidence did not support the use of BMD screening in combination with hormone replacement therapy or calcitonin treatment in menopausal women.

There are currently no generally accepted guidelines for the use of BMD testing. Dual-energy x-ray absorptiometry (DXA) is considered to be the gold standard in bone density measurement technology and is one of the fastest growing single tests in medicine. In Ontario, the number of

BMD tests increased about 600% between 1992 and 1998; the largest rate increase occurred after 1995. In British Columbia from 1989/90 to 1995/96, BMD tests increased at an average annual rate of 45%.

BMD testing services using DXA began in Saskatchewan in 1991 with one machine in Saskatoon. Three DXA machines are now operating—one in Regina and two in Saskatoon. Unlike other provinces, Saskatchewan physicians do not bill the provincial Medical Services Plan directly for providing BMD testing. Testing services are supported either through special program funding by Saskatchewan Health or covered within the regional health authority global budget. The costs of physician interpretation and technologist support services comprise the largest proportion of the budget for BMD testing.

Methods

In 2000 the Health Services Utilization and Research Commission (HSURC) convened a working group representing a range of expertise and opinion to guide the research process. The working group deliberated over the complex issues associated with osteoporosis from prevention to the effectiveness of treatment options and their appropriate use. They decided to focus the research on the use of BMD testing in light of known physician uncertainty about who should be tested, increasing patient request for testing, and the availability of quantitative ultrasonometry (QUS) in the community. While our study was underway, the Osteoporosis Society of Canada (OSC) was at the same time conducting a review of their 1996 clinical practice guidelines for the diagnosis and management of osteoporosis. After concluding that the updated OSC guidelines development process was methodologically sound and the results were evidence-based, the working group agreed to use the 2002 OSC guidelines as the basis for comparing BMD test use with best practice.

We conducted two studies to examine the current referral patterns of BMD testing in the province. Ethics approval was obtained from the University of Saskatchewan.

Patient utilization study

We did a prospective study of patients who received BMD testing in Regina and Saskatoon during a two-month period (May-June, 2001), to determine who was currently receiving BMD testing. Information on osteoporosis risk factors and medication use was collected using a patient questionnaire routinely used in Regina. Consent was received from Saskatoon patients before HSURC researchers administered the questionnaire. A chart review was done to collect information on wait times and test results. During the study period 1,733 patients were tested; questionnaire data were collected from 1,472 (85%). Patients who completed the questionnaire did not differ from non-participants in age, gender, location of residence, or type of referring physician. The former Regina and Saskatoon Health Districts granted ethics approval for collection of the patient utilization data.

Physician survey

We conducted a physician survey of routine office visits to measure the proportion of Saskatchewan residents visiting physicians for osteoporosis-related conditions (estimation of overall population need) and to determine how accessible BMD testing services are for people who require testing (estimate of overall accessibility of testing services). Because osteoporosis is

primarily managed by family physicians and rheumatologists, a stratified random sample was recruited from a list of 902 family physicians and rheumatologists in active practice in Saskatchewan in August 2001. The family physician group was subdivided into three groups: Regina, Saskatoon, and Other. To obtain our required number of participants, 190 invitations were sent to eligible physicians, of whom 38 agreed to participate; 11 physicians did not complete the survey. The main reasons given for non-participation were lack of time and lack of interest in taking part. The final sample consisted of 25 family physicians (Regina 6, Saskatoon 6, and Other 13) and two rheumatologists. Physicians collected information on indications for BMD testing, referral, and treatment for every physician-identified osteoporosis-related visit for 20 regular office days. Counts of the total number of patients seen during the 20 days were also collected to determine what proportion of the physicians' patient visits were related to osteoporosis. Physicians were asked to indicate whether the 20-day study period was unique in any way; all participants reported that the 20 days were typical of their regular practice. Data were collected over six months (October 2001 to April 2002).

Evidenced-based OSC 2002 clinical practice guidelines

In November 2002, the OSC released revised clinical practice guidelines for the diagnosis and management of osteoporosis and these were used to compare current use of BMD testing with best evidence-based practice. The OSC conducted a systematic literature review using Cochrane methodology; almost 7,000 studies were evaluated. All recommendations developed following the review of the evidence were graded according to the level of evidence. The following table provides highlights of the OSC guidelines related to BMD testing.

Table 1: OSC recommendations for the use of BMD testing for assessing risk of fracture

• **Measure BMD only if it will affect management decisions.** Clinical evaluation combined with BMD assessment out-performs any single method of risk assessment.
• **BMD measurement at age 65.** Age is a major risk factor with most osteoporotic fractures occurring after age 65. In 1998, patients over 65 accounted for 93% of all hip fractures among Saskatchewan residents 50 and older. Recent research indicates that some osteoporosis drugs are effective in preventing fractures in this older age group. The U.S. Preventive Task Force recommends routine screening for women 65 and over.
• **All postmenopausal women and men over age 50 should be assessed for the presence of risk factors for osteoporosis; BMD should be measured in those with at least one major or two minor risk factors for fracture (see Table 2 below).** Natural bone loss begins at age 35-40 and for women loss increases especially within three to six years of menopause. Most currently approved therapies have been demonstrated to prevent or reverse bone loss and most are effective when started at or soon after age 50.
• **For patients with long-term moderate to high dose glucocorticoid therapy, evaluate for treatment at time glucocorticoid started; BMD by DXA for follow-up.** Research indicates that bisphosphonates are beneficial in the prevention and treatment of glucocorticoid-induced bone loss.
• **Repeat BMD testing by DXA at one to two years after initiating therapy to evaluate**

response to treatment.
• **Consider repeat BMD testing at two to three years to monitor changing risk for patients 65 and over with test results within the normal range.**
A minimum of two years may be required to reliably measure a change in bone density due to the small changes in bone density and the precision limitations of the measurement.

Table 2: Major and minor risk factors for identification of people at high risk for fracture

Major risk factors	Minor risk factors
• Age > 65	• Rheumatoid arthritis
• Vertebral compression fracture	• Past history of clinical hyperthyroidism
• Fragility fracture after age 40	• Chronic anticonvulsant therapy
• Family history of osteoporotic fracture (especially maternal hip fracture)	• Low dietary calcium intake (recommended daily intake for men over 50 and postmenopausal women - 1500 mg/day)
• Systemic glucocorticoid therapy of > 3 months duration	• Smoker
• Malabsorption syndrome	• Excessive alcohol intake
• Primary hyperparathyroidism	• Excessive caffeine intake (> 4 cups coffee/day)
• Propensity to fall	• Weight < 57 kg
• Osteopenia apparent on x-ray film	• Weight loss > 10% of weight at age 25
• Hypogonadism	• Chronic heparin therapy
• Early menopause (before age 45)	

The OSC recommends DXA as the preferred technology for risk assessment. QUS may be considered for diagnosis of osteoporosis, especially in women over 65, but not for follow-up.

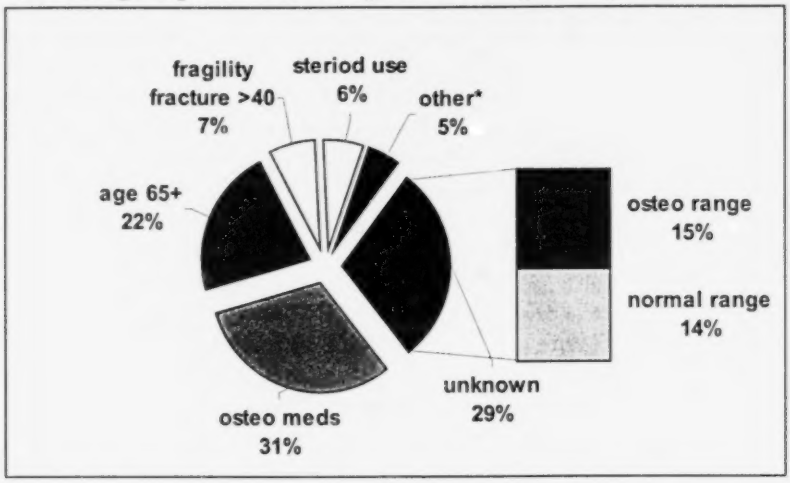
Key Findings

1. Current Saskatchewan referral patterns are consistent with the OSC guidelines

Major risk factors identified by the OSC as indicators for further assessment with BMD testing **and** for which we collected data from patients who received testing were age greater than 65, fragility fracture after age 40, steroid use, propensity to fall, and early menopause (before age 45). We did not collect patient information on all the major and minor risk factors (see Table 2).

- Seventy-one per cent of patients tested reported at least one major indication for BMD testing (Figure 1). Of those for whom a major indication for testing was not identified, about one half (53%) had test results within the range of osteoporosis or osteopenia.
- Fourteen per cent of patients tested reported nonuse of osteoporosis medication, no major risk factor, and had test results within the normal range; most (88%) were women aged 45-64 years.

Figure 1: Percentage of patients receiving BMD testing by major indication for testing



*propensity for falls, menopause <45

A. The OSC guidelines recommend BMD testing at age 65.

Of patients whose visit to their physician was identified as osteoporosis-related:

- The patient was 65 and over in about one half (49%) of family physician office visits; 60 per cent of patients of rheumatologists were 65 and over.
- The main reasons for referral of patients 65 and over (among those for whom BMD testing was indicated at this visit) were:
  - follow-up (treatment or already diagnosed osteoporosis or osteopenia) (45%),
  - symptoms (history of fracture, loss of height, evidence on x-ray, or back pain) (20%), and
  - other risk factors (35%).

Among patients who received testing:

- Sixty-four per cent of patients 65 plus were tested for the first time. The rate of testing was higher for women 65 and over (8.3 per 1000) than for men (0.6 per 1000) (based on June 2001 Saskatchewan population).
- Twenty-eight per cent of patients 65 and over had test results within the range for osteoporosis at the femoral neck, which is associated with an increased short-term probability of hip fracture.

B. The OSC guidelines recommend targeted case finding for individuals at increased risk (at least one major or two minor risk factors are identified as outlined in Table 2 above).

Of patients whose visit to their physician was identified as osteoporosis-related:

- Most patients under 65 (94%) who were referred for testing by their physician were women. One third (34%) were referred because they were postmenopausal. Other indications for referral were follow-up (24%), symptoms (12%), and other risk factors (31%).

Among patients who received testing:

- One half (53%) of women 45-64 years who had not had a previous BMD test, reported non-use of osteoporosis medication, and who did not report having a major risk factor had test results within the normal range (potentially inappropriate testing).

C. The OSC guidelines recommend BMD testing by DXA before consideration of therapy for patients at high risk for fracture except for patients on long-term glucocorticoid therapy. For these patients, therapy may be initiated before DXA testing. Follow-up DXA testing is recommended at one to two years to monitor therapy effectiveness and two to three years to reassess fracture risk for patients 65 and older whose initial test results are within the normal range.

Of patients whose visit to their physician was identified as osteoporosis-related:

- Among patients referred for testing but with no reported use of steroids and not currently using osteoporosis drugs, 15 per cent had treatment started.

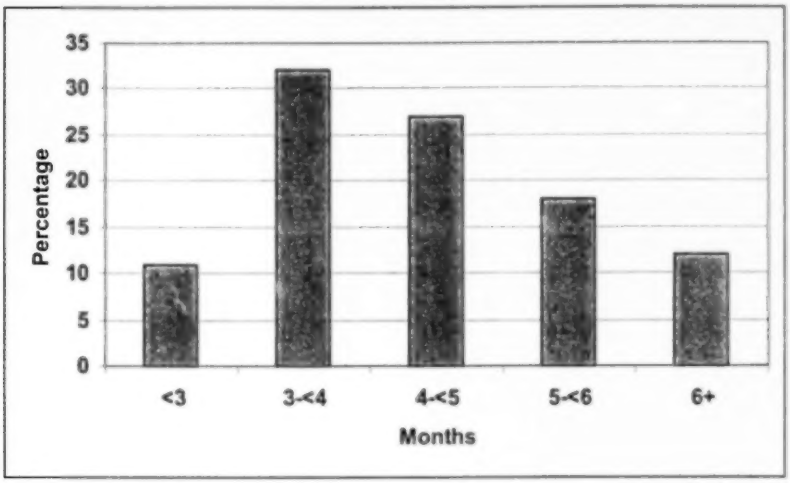
Among patients tested:

- The average length of time between the last and current test was 1.7 years (SD 0.9 years) for patients who reported use of osteoporosis medication and who had had a previous BMD test. About one per cent of patients were tested before one year.
- The average length of time between the last and current test was 2.7 years (SD 1.5 years) for patients 65 and over who reported non-use of osteoporosis medication and who had had a previous BMD test.
- Only half (54%) of patients who reported non-use of steroids and use of osteoporosis medications had had a previous BMD test.

2. Current service capacity may not be adequate

During our study period, the average wait time for testing was 141 days (SD 73 days). Forty-three per cent of patients were tested within four months of the referral being received at the test site (Figure 2). (Adjustments in wait times were made in cases where the patient requested a delay in testing).

Figure 2: Percentage of patients receiving testing by number of months between referral date and test date



Of patients whose visit to their physician was identified as osteoporosis-related:

- Patients requested BMD testing in 10 per cent of these visits; physicians suggested testing in 43 per cent.
- Among those patients whose physician reported that BMD testing was indicated, three per cent refused testing and less than one per cent were not referred because the wait time was too long.

We attempted to measure whether the current service capacity was sufficient to meet the current demand for service by using data from the physician survey. We estimated that the:

- Total number of BMD test referrals was 3,254 per month, an average of four referrals per physician per month.
- Total number of patients for whom testing may be indicated but were not referred (patient refused or wait time was too long) was 228 per month.

The estimated total number of potential referrals per month was 3,482.

The current total testing capacity of three DXA machines operating with full staff is about 1,150 patients per month. During the time of our physician survey, about 1,000 referrals were being received monthly at both testing sites; about 800 patients were receiving testing. This suggests that while there was capacity to manage the number of actual referrals, about 200 patients were added to the wait list per month.

Some factors may account for the three-fold difference in our estimate of total number of referrals compared to the number of actual referrals received:

- Physicians who volunteered to take part in our survey may have been more interested in osteoporosis and performed assessments more frequently than those who declined to participate,

- Physician awareness of osteoporosis may have increased during the study period and more assessments and subsequent referrals were made than would have occurred routinely, and
- Some Saskatchewan residents chose to go to Alberta and Manitoba for BMD testing. It is unlikely that this factor is responsible for most of the difference.

Discussion

Physician referral for testing is appropriate

Our results suggest that most patients are being referred for BMD testing in accordance with the OSC 2002 guidelines. There does not appear to be much overuse of testing services. Seventy one per cent of patients who received testing reported a least one major risk factor for osteoporosis or reported use of osteoporosis medication. The average interval between testing was 1.7 years—the recommended interval is one to two years. Thirteen per cent of all patients who reported nonuse of osteoporosis medication, no identifiable major risk factor, and no previous BMD test had test results within the normal range, which may suggest that testing was not indicated. This percentage is likely an over-estimate of the number of patients with no indication for testing, because data on several major and minor risk factors identified by the OSC as indications for further assessment were not available.

About one half of the women 45-64 years tested who had not had a previous BMD test and who did not report having a major risk factor or use of osteoporosis drugs had test results within the normal range, which may suggest perimenopausal or postmenopausal screening was done. Post menopause was a main reason physicians reported for referring women under 65 for testing. The OSC reports that screening is not justified in postmenopausal women or men over 50 and under 65. The guidelines should aid physicians in identifying younger men and women for whom BMD testing is indicated.

Current testing capacity is likely insufficient for quality risk assessment and monitoring

Our findings indicate that the current level of BMD testing services in Saskatchewan is likely insufficient to meet the predicted increased need for testing. At the time of our study, the average wait time was four and one half months. Wait times are dependent on a number of factors including availability of the technology and the personnel to conduct tests and interpret results. Since we collected our data, wait times have doubled to about eight months. One reason for the shorter wait time at the time of our data collection was that the Regina site began operation seven months before and was testing patients originally referred to Saskatoon—thereby reducing waiting time. Other reasons for the subsequent increase in wait time include a shortage of technologists, and the need to reallocate resources to other testing services. There has been an increase in BMD test referrals in light of the recently released evidence on the risks associated with hormone replacement therapy, which has been a preferred treatment option for menopausal women.

One indicator of a shortfall in testing capacity is the percentage of patients on osteoporosis drugs who are not tested for a baseline measure before treatment is started. The OSC recommends, except for patients on long-term glucocorticoid therapy, BMD testing by DXA before consideration of therapy. Of patients who received testing, about one half of those who reported

use of osteoporosis drugs and non-use of steroids had had a previous BMD test. Fifteen per cent of patients appeared to have had treatment started before baseline testing of those whose physician reported an indication for BMD testing during their visit. The effectiveness of treatment is difficult to evaluate in patients started on therapy with no baseline test. The OSC guidelines suggest that the effectiveness of treatment cannot be determined less than one year from the initiation of treatment; therefore physicians need to be able to specify optimal timing for useful follow-up.

Research suggests that some high-risk groups for fracture—such as patients who are on long-term steroid use and those who experience a fragility fracture over the age of 40 -- are not adequately assessed for osteoporosis. It is likely that Saskatchewan is similar to other jurisdictions in this regard, however we were unable to measure this. The main reasons physicians reported for referral of patients 65 and over were follow-up and symptoms, which suggests that physicians are identifying high-risk patients in this age group. The demand for testing will likely increase given the OSC recommendation to screen at age 65 and with improved assessment of high-risk groups. Our estimates suggested that increased awareness and interest in the management of osteoporosis by Saskatchewan physicians might result in a three-fold increase in the number of patients referred for DXA testing per month. Every new case of osteoporosis identified will result in a need for more service.

Our research indicates that the average time between testing was appropriate for patients reporting use of osteoporosis drugs and for patients 65 and over who reported non-use of these medications. With the doubling of the wait time, it is likely that most patients are still being tested within the appropriate timeframe. Given the current system (first come, first served) physicians consider the wait time when sending a referral for follow-up.

Ten per cent of patients whose visit to their physician was osteoporosis-related requested a BMD test. This would suggest that there is not a high patient demand for testing. This could be due to a number of reasons, including lack of awareness of the test and concern about the implications of a diagnosis and potential treatment. Although patient demand may not be high, osteoporosis and the testing of BMD particularly by QUS is gaining a higher public profile throughout the province. Heel ultrasound is being marketed directly to the public and is available in community settings at a direct cost to the patient. No guidelines or quality control measures are in place. The College of Physicians and Surgeons of Saskatchewan is drafting guidelines for the use of QUS.

More evidence is needed

The diagnosis of osteoporosis is an evaluation of fracture risk. The relatively recent increased awareness of osteoporosis and the availability of drug therapy shown to reduce the risk of fracture have resulted in an increased need for accurate diagnosis and assessment. Evidence is still needed to address important issues. The effectiveness of screening to reduce the incidence of fractures has not been evaluated. Cost effectiveness studies on the use of BMD testing and osteoporosis drugs are also not available. Finally, there are no generally accepted criteria for when treatment should be started.

Other factors need to be considered

Although BMD testing is currently the only generally available, objective measure of fracture risk, other non-skeletal factors are important contributors. Treatment decisions should be based on a comprehensive assessment of risk for fracture and not solely on BMD measurements. The OSC emphasizes the importance of clinical assessment for risk factors and the consideration of patient preference in management decisions. BMD testing should be done only if the results will affect patient management.

Recommendations

1. Increase BMD testing services

Saskatchewan Health, in conjunction with the regional health authorities, should consider increasing existing BMD testing services. Expanding capacity has the potential to improve assessment and monitoring of osteoporosis, which in turn can reduce the incidence of fragility fractures and the resulting mortality and morbidity associated with them.

Strategies to increase testing services that should be explored include:

- Increase the number of DXA machines. DXA remains the most accurate tool for evaluating BMD in clinical settings and is the preferred method of testing;
- Recruit and retain personnel trained to conduct BMD testing;
- Evaluate technology -- including quantitative ultrasonometry -- as a cost effective adjunct to DXA services, particularly in remote areas, for screening patients 65 and older. Evidence suggests that QUS is effective in estimating fracture risk in women over 65; the OSC recommends that this technology may be considered for diagnosis of osteoporosis but not for follow-up. If QUS is used for screening, this service should be coordinated with DXA testing services for appropriate follow-up of abnormal results and provided by qualified personnel with quality control measures in place, and
- Schedule follow-up tests as close as possible to optimum date, as specified by the physician in accordance with the OSC guidelines.

Increasing BMD testing service capacity will enable providers to assess fracture risk in a timely manner prior to commencing therapy and to appropriately monitor therapy effectiveness and change in fracture risk.

2. Provider and public education on appropriate use of BMD testing

The Health Quality Council, in collaboration with key stakeholders, should facilitate the development and implementation of a provincial knowledge transfer strategy for the Osteoporosis Society of Canada's 2002 clinical practice guidelines and associated educational materials. Given current service capacity and the potential increased demand for service as a result of the new OSC guidelines, such an education strategy should focus on identification and priority assessment of individuals at highest risk for fracture. Also, this strategy should build on initiatives developed in other parts of Canada and be adapted to the Saskatchewan environment.

Educating both service providers and their patients will promote the consistent use of best evidence in the diagnosis and management of osteoporosis, resulting in improved quality of care.

3. Support for other services designed to reduce fracture risk

Saskatchewan Health, regional health authorities, and other relevant groups should support the development, implementation, and evaluation of programs designed to minimize fracture risk (e.g., fall prevention, medication use, nutrition, physical exercise, and smoking cessation). Support should be given not only to services that target high-risk groups, such as the elderly, but also programs that promote healthy lifestyles in younger people.

Selected References

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Glossary

Testing sites used the WHO definitions for interpreting BMD results, which are based on a comparison of a patient's BMD with the mean for a normal young adult population of the same sex and race:

- Osteoporosis - T score less than -2.5 SD.
- Osteopenia - T score between -1 and -2.5 SD.
- Normal - T score greater than -1 SD.

Osteoporosis is associated with a four- to five-fold increase in fracture risk. Osteopenia is associated with a two-fold increase.

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